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The Arboretum Bulletin

Plants of the Sea in Peace and War

George B. Rigg[*]

WE ARE familiar with plants that grow on land and with the food and industrial products that they supply. We are less familiar with plants that grow in the sea and are often inclined to think of them as being of little importance. The term sea weeds so commonly applied to all plants growing in the sea recognizes this view. The facts are, however, that marine plants are very important to us, and have been utilized for industrial purposes as well as for food for man and beast for a long time.

Plants of the sea vary in size from the microscopic diatoms to the large kelps which reach a length of 150 feet. They are mostly algae, but there are a few marine plants that reproduce by seeds. The algae are all reproduced by spores and are thus very different from seed plants. Many marine algae grow on the sea bottom along shore at depths of 60 to 75 feet or less and are thus not ordinarily seen except when they break loose and drift on the surface or are cast ashore. A good many algae also grow along the shore between high and low tide and are thus commonly seen. The large kelps have floats which keep the free end of the plant at the surface, though it is anchored by a holdfast to a rock or other object on the sea bottom often at a depth as great at 60 feet. Many kinds of diatoms and some other one-celled plants of microscopic size float free in the water but the algae visible as individual plants to the human eye are all attached to solid objects by holdfasts. Only three species of seed plants grow in the sea along the shores of Washington—one species of eel grass and two species of sea basket grass.

The oldest uses of marine algae are their use as human food and as a source of potash for use as fertilizer and in industry. There are references to the use of marine plants as food 240 years ago and the definite records of such use in Scotland go back to 1800. Marine algae are commonly used as food by the people of Japan and China and by the coastal Indians of the Pacific states and Alaska. Up to December 7, 1941, several kinds of dried algae from the Orient were sold in some Seattle stores. In May, 1942, some from the Orient were on sale but a few kinds obtained from Puget Sound sources could be purchased. Recently certain restaurant men have placed an order with a concern in a Puget Sound city for a considerable quantity of dried baled kelp fronds.

The small amount of energy-supplying material in marine algae is balanced by the large mineral content and the abundance of vitamins in them. Recent feeding experiments and chemical determinations confirm the earlier assumptions of the common occurrence of vitamins in marine algae. Six species of the Puget Sound region compare favorably with many fruits and vegetables as a source of vitamin B. Several are rich in vitamin C and one of these contained as much of this as lemons do. One red alga harvestable in quantities by hand is a good source of both B and C. The sea lettuce so common on our beaches is a good source of C. It is an interesting fact that the algae exposed on our beaches at low tide are richer in vitamins than those that grow below low tide and are thus submerged all the time.

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[*] The writer has supplemented the facts familiar to him through his own experience by the use of data from several recent papers, especially those by Dr. E. R. Norris, Dr. C. K. Tseng and Dr. V. B. Scheffer.

The burning of marine plants for the potash content of the ash is an old practice. Interest in kelps as a source of potash for fertilizer was increased in 1911 when Germany limited the export of potash from the Strassfurt mines and the United States Bureau of Soils began to investigate our own sources of potash. It was found that the large kelps of the Pacific Coast could supply all the potash that we can use for all purposes, but that it can be supplied cheaper and in quantities to meet all our needs from salt deposits in Southern California and other states eastward to Texas. In this experimental work the potash was not obtained by burning and the organic matter was thus not destroyed. This field work of the Bureau disclosed that the local use of kelp as ferilizers was common along the Pacific Coast. At Kodiak, Alaska, kelp had been used as the only fertilizer for potatoes as long as anyone living there could remember.

The products of the marine algae that are of greatest importance in our war economy are those variously referred to as gums, mucilages, gels, and gelose or agar. Even before Pearl Harbor we were annually extracting about $3,000,000 worth of these substances from a number of species on the Pacific Coast and the Atlantic Coast. In addition to the home production we were importing about $1,000,000 worth of these products annually. Most of those from the east coast came from the New England states and of the west coast from Southern California. The production has increased during the war years, but no figures have been made available.

Gums from marine algae form some mucilaginous semi-liquid products and some firm jelly-like products. The fact that they can form these materials even when they are present in small concentrations in water makes them important. They are used as stabilizers, flocculents, and semi-elastic media where relatively inert substances that are not poisonous and have a large attraction for water are required. Many attempts have been made to replace these with laboratory products, but such efforts have so far met with failure and the marine algae remain the only important source of such materials at present.

At the outbreak of the present war we lacked definite information about the local occurrence of the algae that were the basis of expanding existing industries or were possible new sources of economic materials. We also had little information about their abundance and condition at different times during the year. There were many scientific lists of marine algae but these did not give the information needed by industrialists. Much progress has been made in supplying this information.

Agar (often called agar agar) is one of the most important of the products of marine algae, and it was the one whose lack was most critical in the months following Japan's attack on us. Japan was then, and undoubtedly still is, the leading agar producing country of the world. In 1936 that country had over 500 establishments and produced over 5,000,000 pounds of agar valued at $2,400,000. In 1941 the total production in the United States was 52,000 pounds, all coming from one factory in Southern California. There are now five agar factories in that region and it is confidently expected that their output will total 200,000 to 250,000 pounds annually. In 1941 we imported 565,000 pounds from Japan and 32,000 from China. It thus appears that our present capacity for producing agar is less than half of the amount we were importing before the war began. However, a good deal of used agar is being reclaimed and our production will continue to expand so that the situation is not very critical. Agar is also being produced in commercial quantities in Russia, Australia, New Zealand, and South Africa.

The efforts to increase the production of agar in this country when the Oriental supply was cut off were along several lines. (1) More complete knowledge of the supply of the species already in use. (2) Improvements in methods of harvesting. (3) The discovery of species other than those already in use which might yield agar. (4) A study of the natural means of reproduction of the species used in order to determine whether harvesting is likely to destroy plants more rapidly than they reproduce naturally. (5) The possibility of rearing the agar producing species in large concrete basins constructed in the margin of the sea.

Agar is a dried gelatinous material extracted mostly from a few species of the genus *Geledium* of the red algae. It is harvested by divers at depths of 100 feet or less. It comes into the market in the form of powders, flakes, strips, or blocks. Its most important use is as a solid medium for the culture of bacteria and other micro-organisms. No other material has been found which is a satisfactory substitute. Tests involving the growth of micro-organisms on agar are involved directly or indirectly in the practice of every physician. Laboratories of public health depend upon it. The fact that it is so essential in the diagnosis of disease and in the promotion of public health has caused the War Production Board to give attention to the supply. Two months after Pearl Harbor it issued an order restricting the use of agar to the preparation of bacteriological media. At that time only 18 per cent of the agar used in the United States went into media. The other 82 per cent was used for the various purposes which will be mentioned later.

Tseng (1944) has collected from dealers and other sources the following information about the use of agar in the United States for various purposes before the war:

	Pounds
Laxatives	100,000
Microbiological culture media	100,000
Bakery	100,000
Confectionery	100,000
Dental impression molds	75,000
Meat packing	50,000
Emulsifiers	50,000
Cosmetics	25,000
Miscellaneous	50,000

Among the reasons why agar is more desirable than gelatin as a culture medium are its greater jellifying power and its lower cost. Agar is also especially suitable for a culture medium because it has a firm consistency at the temperatures at which bacteria and other micro-organisms must be incubated in order to make them grow, and because it is not liquefied or chemically changed by the metabolism of these organisms. Its surface is firm and rubbery and is not easily broken by the needle with which organisms are streaked across it in making cultures. In addition to its use by bacteriologists, agar is also used in growing fungi, algae, and orchids. The plants used in the movie film "Bottle Fed Orchids" were growing on specially prepared agar.

Agar is suitable for use as a laxative because it absorbs and holds water and functions as a lubricant and mild stimulant. It is used in baking because it keeps bread and other bakery products from drying out. Jelly-like candies are healthful and require less sugar than similar products made without the use of agar. Agar makes excellent dental impression molds when a dye and a disinfectant are added. It is desirable for this purpose also because it has a wide temperature range between liquefying and hardening. Large quantities of agar are used in canning meat and fish in Japan and Australia and this use in our own country is considerable and seems likely to increase. Agar keeps the softer portions of meat and fish from falling apart and its jellying power is not destroyed by the high temperatures used in canning. It is also used as a temporary preservative, especially in places where refrigeration is not available for meat and fish which tend to spoil quickly. Agar is used to stabilize emulsions carrying vitamins and in other pharmaceutical preparations. One of its cosmetic uses is in glycerine jelly used for chapped hands. Large quantities of agar are used as food in China and Japan, being added to rice or used, sweetened and flavored, as a diet in hot regions. It has little nutritive value but is considered appetizing.

Agar has several uses not mentioned in the above list, but possibly included under the last item, miscellaneous. Among these are its use in sizing silk and paper, in nicotine sprays for pest control, in the tanning industry, in photographic plates and films, in dentrifrices, and as a lubricant in drawing tungsten wire for electric lights.

Another gum-like material obtained from algae and used in industry is algin. It is made from several species of one genus of brown algae. These plants are much larger than the ones from which agar is made and their harvesting is thus less tedious. The most important use of algin is in the manufacture of ice cream. It might seem that this use is of relatively little importance in time of war, but soldiers as well as civilians like ice cream and they eat plenty of it, both at home and abroad, when they can get it. About one pound of algin is required for stabilizing 120 gallons of ice cream. Algin also contributes to the war effort by serving as a creaming agent in the treatment of the latex material from land plants, finishing leather, waterproofing concrete, fireproofing wood and camouflage materials, treating boiler water, and in can-sealing compounds and in water-base paints. In keeping with the wartime policy the government's actual figures on the current rate of algin production are not released, but in 1941 about $1,500,000 worth of algin and alginates were produced. These were in the form of alginate compounds (many of them sodium alginate) selling as low as five cents a pound, in alginate pastes for water purification selling at about seven cents per pound, and as pure algin selling at about $1.00 per pound.

Another important item is Irish Moss—*Chondrus crispus*—one of the red algae. Its most important and familiar use is in suspending the cocoa particles in chocolate milk so that they will not settle out. It is also used for clarifying beverages and as a suspending agent in many foods, drugs, cosmetics, and industrial liquids.

Other commercial products from algae are of less importance. Some kelp meal used as an ingredient of stock feed was imported from the Orient through cities of the Pacific Coast before the war, and some is being manufactured now in the Puget Sound region. Hand soap containing kelp products is also manufactured in this region. Dulse is a relish prepared on the east coast from a red alga and is on sale in many places in the United States.

Eel grass (a seed plant) is abundant in the shallow waters (with mud bottom) on both the Pacific Coast and the Atlantic Coast. It is of considerable commercial importance. When dried it is the basis of a building material of high insulating quality. It is also used for stuffing furniture and mattresses. It is utilized on the Atlantic Coast, but no commercial use has been made of it on the Pacific Coast.

While commercial products from marine plants thus run into millions of dollars annually and contribute much to national economy during both peace and war, these plants also play a fundamental role in the existence of animal life in the sea. This is less obvious than the phase which speaks in dollars and, therefore, often entirely escapes attention. All animals both on land and in the sea are dependent ultimately on plants for their food. Many marine animals eat other animals but the food cycle is traceable to green plants as the primary food. This is evident when we remember that green plants manufacture simple sugars, starch and other foods from carbon dioxide and water, while animals cannot do this. A large fish may eat smaller fish and these smaller fish may eat still smaller and simpler animals such as copepods, which, in turn, live entirely upon microscopic plants such as diatoms. The diatoms contain chlorophyll and are thus, by the use of light energy from the sun, able to convert inorganic materials into organic foods and hence are the basis of the food necessary for all life in the sea.

Ericaceous Plants of Northwest America

CARL S. ENGLISH, JR.

THE *Ericaceae* is typically a family of the temperate and mountain life zones in regions of humid air, heavy rainfall and acid soil, and one in which the members, in high percentage, rank as subjects of real ornamental value. It is not surprising, then, that garden enthusiasts of the Puget Sound area look to this family to furnish a goodly portion of the shrub requirements of their gardens and parks.

In view of the fact that the Pacific slope satisfies the various requirements of the family, it is natural that we should expect to find a generous representation of its members native to this region, and such is the case. Although many of them are so well known and so extensively used by gardeners here that their names need only be mentioned, others, though well known, are so little appreciated as to be orphans in their own region, and still others are so seldom encountered as to be classed as really rare plants or at least as restricted in range.

It is interesting to note that in the *Ericaceae* occurs the transition from flowers with separate petals to flowers with united corolla. In our region the monotypic genus, *Cladothamnus,* is one of the two genera representing the plants with separate petals. *C. pyrolaeflorus,* the copper bush, is found infrequently in the mountains from Alaska to Oregon. It is a deciduous shrub of two to five feet with its copper-colored flowers borne in scattered arrangement up and down the branches. The flowers, which measure about an inch in diameter, resemble very closely those of *Pyrola* with its long, curved style—thus the specific name, *pyrolaeflorus. Ledum,* the other genus with separate petals, has aromatic, evergreen leaves and dense heads of small, white flowers. The plants resemble very closely some of the small-leaved rhododendrons, except for the separate petals and the lack of scales on the leaves. *L. groenlandicum,* Labrador tea, frequents nearly every lowland bog, as well as many of the mountain bogs, from Greenland to Canada and the Northern United States. It is a shrub three feet in height with rather narrow leaves which have revolute margins and a brown wool on the under surface. It is an easy shrub to cultivate in the shrub border and does very well out of its bog habitat. A related and localized species is *L. Columbianum* which occurs in the coastal bogs from Ilwaco, Wash., south into Oregon. It lacks the brown wool on the under surface of the leaves. A very distinct species is *L. glandulosum,* a shrub two to four feet high, with ovate leaves. It occurs in both the Rocky mountains and the Cascades, either in bogs or on mountain sides, not being restricted to bogs in its natural habitat as are the other species.

Of the rhododendrons occurring here, *Rhododendron macrophyllum (R. californicum)* and *R. occidentale,* the western azalea, need no introduction as they are both well known and much cultivated here as well as in other countries. *R. macrophyllum* displays its gorgeous pink flowers in May along the western slope from British Columbia to California. *R. occidentale,* with large, fragrant, cream to pink flowers, often grows to a height of fifteen feet along the western part of Southern Oregon and Northern California. *R. albiflorum,* a deciduous shrub of about five feet, is found in the Rocky Mountains of Montana and British Columbia and the Cascade Mountains of Oregon, Washington and British Columbia. Its creamy white flowers come from axillary buds up and down the branches instead of being in a head as is the case with most familiar rhododendrons. On the mountain slopes, and especially in the subalpine meadows, it is a very attractive shrub but, as yet, seems to be seldom found in cultivation.

Three additional species of rhododendrons are found in Alaska and the Aleutian Islands. *R. lapponicum,* a quaint little evergreen plant less than a foot in height, has very small leaves and small purple flowers. The other two species, *R. camtschaticum* and *R. gland-*

ulosum, both are low, depressed, deciduous shrubs with rose-red or rose-purple flowers. *R. camtschaticum,* with pubescent corolla and non-glandular leaves, is found from Alaska throughout the Aleutian Islands and from Kamchatka to Japan. *R. glandulosum,* with glabrous corolla and glandular leaves, is a rather rare species, coming from Imuruk Basin, Alaska. Apparently it is not in cultivation but it is hoped that someone will make an effort to bring plants out when horticultural exploration is again possible. Both *R. camtschaticum* and *R. glandulosum* need quite a peaty soil.

Several members of the *Ericaceae* found in northern countries are among the considerable group of plants often referred to as circumpolar, meaning that they occur around the pole. Most of them are found in all of of the northern countries around the world and often in the mountains at lower latitudes. In some cases they have been left isolated in certain locations at lower latitudes by continental glaciation. Most of these plants are small arctic alpines which please the fancy of alpine specialists. Among such plants to be found in Western North America and Alaska, is *Loiseleuria procumbens,* the alpine azalea, a neat, little, intricately-branched shrublet with pink flowers and deep green leaves. Other ericaceous plants in this same category include: *Phyllodoce caerulea, Cassiope tetragona, Arctostaphylos Uva-ursi, Arctous alpina, Chamaedaphne calyculata, Vaccinium Vuis-Idaea* and *Rhododendron lapponicum.*

Menziesia ferruginea, commonly known as fool's huckleberry, is an interesting shrub of the mountain woodlands. It is of azalea-like habit of growth, has small whitish flowers and fruit in the form of a dry capsule, which gives it the well-known common name.

Two typically arctic and mountain genera are represented in our mountain meadows of the Northwest. Commonly referred to as "heathers," they include *Phyllodoce* and *Cassiope.* All members of *Phyllodoce* have needle-like leaves, similar to those of *Erica. Phyllodoce empetriformis,* the pink heather, which is common in the mountains from British Columbia to California and east to Montana, is one of the more ornamental and desirable members of this group for cultivation. Others are *P. Breweri* from the high Sierras of California, which also has showy, pink flowers, and *P. glanduliflora* which occurs from Alaska to Oregon and is usually found at somewhat higher elevations in the mountains. It has sulphur-yellow flowers, characterized by sticky pubescence. *Phyllodoce aleutica,* with white flowers, and first found in the Aleutian Islands, is now known from Alaska to Kamchatka and Northern Japan.

All of our members of the genus *Cassiope* have white flowers and all but one have imbricated leaves which clothe the branches. Here in our local Cascade Mountains *C. Mertensiana* is our representative of this group. Its range extends from Alaska to California. C. V. Piper named three varieties of this species: *gracilis, ciliata* and *californica.* The variety, *gracilis,* which I collected in the Blue Mountains and the Wallowa Mountains of Oregon has proved an interesting little garden subject and a plant well worthy of varietal recognition, having more slender leaves and branchlets, and being much lower-growing than the species. Related to *C. Mertensiana* is another species, *C. lycopodioides,* which, as its name suggests, looks like a lycopodium, is a neat little alpine not over four inches in height, and comes from Eastern Asia and Alaska. The circumpolar species, *C. tetragona,* is found in Alaska, growing from two to twelve inches in height. Its distinguishing character is a groove on the backs of the leaves. A related plant is the Rocky Mountain species, *C. saximontana,* found near the summit of Sulphur Mountain, in the vicinity of Banff, Alberta.

A distinctive species is *C. Stelleriana,* a low-growing, broad mat-forming plant with needle-like leaves. The white flowers, each with reddish calyx, form very attractive little nodding, open bells. A solid mat of this plant, approximately fifty feet wide and a hundred feet long was found in the region of Mt. Baker. Originally found in Alaska, and thus called Alaska heather, it is now known to occur as far south as Mt. Rainier and west into the Aleutian Islands and Eastern Asia.

Because of the ever changing conditions on the earth, a corresponding constant change in plant life must arise to meet the new conditions. Groups of plants have come, flourished and gone and new ones have taken their places. Of many such families or genera, there may now survive only one or a few species, often isolated geographically. These plants are sometimes referred to as relic species of a former flora. Among the higher plant families, the Ericaceae is very old and it is natural that we should expect to find a few such relics within this group.

The Siskiyou Mountain region of Oregon and Northern California is noted for its relic flora. Two outstanding members of the *Ericaceae* belonging to this group are *Kalmiopsis Leachiana* and *Leucothoe Davisiae.* Although *Kalmiopsis Leachiana* was discovered as recently as 1930 by Mr. and Mrs. Leach of Portland, Oregon, it has already become widely acclaimed and cultivated by many garden enthusiasts. The original place of discovery of this fine plant was on the highest peaks of the Siskiyou Mountains of Southwestern Oregon. A low shrub of about a foot in height, it has terminal racemes of rosy-purple flowers about two-thirds of an inch across. Because its nearest relative is probably the genus *Kalmia,* Dr. Alfred Rehder of the Arnold Arboretum gave it the name, *Kalmiopsis.*

Although the genus *Leucothoe* contains several species, only the one, *L. Davisiae* is native to Western North America and it belongs to a subgenus with only one related species, *L. Keiskei,* a native of Japan. Like *Kalmiopsis, L. Davisiae* grows on the high peaks of the Siskiyou Mountains of Oregon and is found in various places in the mountains of California as far south as Madera County. Although *L. Davisiae* has been known much longer than *Kalmiopsis,* it has not received nearly as much attention from gardeners as it deserves, partly because it is little known and because it has not been generally available. It is one of my favorite plants, and especially the favorite of all the species of *Leucothoe* I have seen thus far. Although it is described as growing to three feet in height, the plants sent to me by Mrs. Leach eight years ago have not exceeded a foot in height. The creamy white, nodding, urn-shaped flowers are borne in upright, terminal panicles, resembling somewhat more the flowers of *Pieris* than those of *Leucothoe.* The new foliage growth has the bronze-red coloring that is noted in many other ericaceous plants, and the winter coloring is also of reddish tones. Each season this species wins more and more friends and it is hoped that in time to come it can be propagated fast enough to supply the demand of all those who desire to grow it. It increases to a moderate degree by underground stolons, also by seed, but the seeds are extremely small and the seedlings require much careful attention in their earlier stages of growth.

Kalmia, a North American genus of about ten species, includes one widespread species, *K. polifolia,* which is found in nearly every acid bog across the northern part of the continent. It is found in practically all of our local bogs, growing with *Ledum groenlandicum,* but not so abundantly as the latter. Like the *Ledum* it can be grown easily in the garden, without the benefit of a bog, by the generous use of peat moss worked into the soil. It is a shrub of about one and a half to three feet in height with smooth evergreen leaves and pink flowers. Of all the various physiological adaptations of flowers for securing cross-pollenization, that of the *Kalmia* is one of the most unique. The anthers nestle in little pouches in the corolla and when the pollen is ripe the merest disturbance of an insect alighting on the flower is enough to cause the anthers to be flipped out of the pouches by the spring-like filaments, showering pollen all over the insect. Then the insect alights on a flower of a neighboring plant, inadvertently depositing some of the pollen on the stigma.

In the West there are two or more subspecies of *K. polifolia,* or separate species, according to your interpretation. Because of their differences I think that they might just as well be treated as separate species. The most distinct one is *K. microphylla,* found at 7,000 to 8,000 feet elevation in the Cascade Mountains and at 10,000 to 12,000 feet in the Rocky Mountains. This is a diminutive alpine with small leaves and the habit of making little mats one to three inches high. The Rocky Mountain form of this plant that I have collected has quite narrow leaves while the leaves of the Cascade Mountain plant are rather broad. A less distinct variety is *K. occidentale* from Mount Rainier and the Cascade Mountains, growing at lower elevations and reaching a height of about one foot.

Two related genera are *Arbutus* and *Arctostaphylos.* Members of the genus *Arbutus,* which includes our madrona, *A. Menziesii,* are all large shrubs or trees. About ten species are to be found in Western or Central North America. Of these, only *A. Menziesii* is native and hardy here, as none of the other species is encountered until we reach Southern California, Arizona and Mexico. As a broad-leaved evergreen tree, *A. Menziesii* is unsurpassed.

Arctostaphylos comprises fifty or more species, and except for the circumpolar species, *A. Uva-ursi,* the bearberry or kinnikinnick, is confined to Western North America and especially to California where new species apparently are still in the process of development and where they seem to enjoy dryer conditions than do most other members of the *Ericaceae. A. Uva-ursi, A. nevadensis* and a few of the California species are low, creeping shrubs that make excellent ground covers. *A manzanita,* commonly called manzanita, *A. tomentosa,* the woolly manzanita, and *A. patula,* are among the more northerly and hardier species. They are attractive, upright, much-branched shrubs with white or pink flowers.

Although we generally think of *Chamaedaphne calyculata* as a European and Eastern American shrub, it also grows in Alaska and British Columbia. It is a desirable, low shrub, one to two feet high, suitable for use in the shrub border. It has handsome, white flowers along the under side of the arching branches.

Gaultheria Shallon, the salal, is often not appreciated as it should be, perhaps because it is so plentiful here and because there is a general tendency on the part of the public to overlook the value of good, natural ground covers. In woodland plantings it is advisable to leave the salal undisturbed and plant the rhododendrons or other tall-growing shrubs in among the salal clumps. Its racemes of large white flowers with reddish calyx are very attractive. Two other species of *Gaultheria* are to be found in our mountains, *G. ovatifolia* grows about six inches in height, forms large mats of shiny green leaves and has small white flowers and red, edible berries. It is found at moderate elevations in the mountains. *G. humifusa* is much like *G. ovatifolia* except that it is smaller, the leaves are not so shiny and it is found at higher elevations in the alpine zone. Both are valuable little ground covers for shady situations requiring a low-spreading plant.

One of the most charming little ground and log covers for shady places is *Chiogones hispidula* which forms dense, bright green carpets studded with white berries in summer and often called snowberry. Although its range is mainly in the East, from Newfoundland to North Carolina and Michigan, it also grows in British Columbia, so can be included here. The only other species is in Eastern Asia.

Although the name, *Vaccinium,* suggests blueberries and huckleberries and something good to eat, some of the members of this group have ornamental value, as well. Our *V. ovatum,* the evergreen huckleberry is one of the common shrubs along the coastal strip from Central California to British Columbia and, like the salal, its landscape value has been too often overlooked. Also like the salal, it is much gathered as greenery for the florist's trade. In shady places *V. ovatum* will grow to heights of nine feet but in open, windy exposures such as the sand dune country along the Oregon coast, it takes on fantastic shapes, all of which seem to be moving off in the same direction.

Vaccinium Vitis-Idaea is represented in Alaska and British Columbia by the variety,

(Continued on Page Thirty-three)

Lilies for the Garden

Beatrice L. Palmer

UNTIL recently lilies were considered a garden luxury, expensive and difficult to grow. But now that so many lovely species and varieties are proving suitable and easy to grow in ordinary gardens, they are rapidly increasing in popularity. So much so that it seems possible the demand may exceed the supply, at least during war time, when importations from outside our own country are reduced to almost nothing. However, lily growers in Canada and the U. S. A. are manfully doing their best to cope with the situation and are achieving most satisfactory results in the matter of quality, even though there is still need for greater quantity. A number of varieties which used to be imported from Japan, including the auratums, were all too frequently infected with virus disease, the bane of lily growers. These lilies are now being raised from seed on our own side of the Pacific and sound, healthy bulbs are being offered, and eagerly snapped up by discriminating buyers.

There are no lilies native to the countries south of the Equator, but the different species are widely distributed throughout the northern hemisphere and we on the Pacific Coast are fortunate in being able to grow a large majority of them in our gardens. Our climate is, as we know, the best in the world for all-around gardening and land that will grow good corn and potatoes will also grow most of the more dependable and popular lilies.

The majority of lilies do best if planted in the fall, as soon as possible after the foliage and stems die down, thus giving the roots time to become well established before winter sets in. The various kinds are not all ready at the same time, and a special effort should be made to deal with the Madonna Lily *(L. candidum)* in August, before the characteristic winter-hardy leaves begin to grow. *L. testaceum* and the martagons are best moved in September and the lilies which bloom in late June and July, at the height of the season, are generally ready to plant early in October. The late flowering varieties, such as *L. Henryi* and the auratums and speciosums are seldom ready for digging until the latter part of October and may be planted as late as December, provided the ground is not frozen.

Careful preparation of the ground before planting will be amply repaid. All lilies have one essential requirement, *good drainage.* If this is not natural to the chosen location it may be obtained by digging a hole at least two feet deep and placing broken bricks, stones or similar material in the bottom and using a liberal amount of sand, leaf-mold or peat moss mixed with the soil which surrounds the bulbs. Even the so-called "swamp lilies" are found growing naturally either on the banks of streams or on natural hummocks of ground raised above the surrounding bog.

If possible, it is well to prepare the ground a month or more before planting. An ideal soil for most lilies is one which is sufficiently porous to permit fast winter drainage, but rich in humus which will retain moisture during the summer. Heavy soils may be improved by additions of sand and leaf-mold or peat moss, and bone meal, or blood and bone fertilizers, are safe and suitable. Stable manures should not be allowed to come in immediate contact with the bulbs, but may be used to great advantage as a top dressing or winter mulch. By spring the manure will usually have become incorporated with the top soil.

Nearly all lily catalogs give the correct depths for planting bulbs of different varieties. *Lilium candidum* and *L. giganteum himalaicum must* be planted shallow, preferably with the tips of the bulbs on a level with the ground surface. *L. testaceum* prefers about two inches of soil over the tops of the bulbs, and a general rule for most other kinds is twice the diameter of the bulb in depth of soil above the top of the bulb. In localities where there is danger of injury to the new growth from late spring frosts it is advisable to plant deeper, so as to delay the appearance of growth above ground. And in very heavy soil moderately shallow planting is best.

Lilies look best planted in clumps of from three to a dozen bulbs, rather than dotted about singly. All types prefer the ground around their feet shaded, and the tall growing varieties enjoy positions amongst low-growing shrubs and perennials. Popular associations are *L. candidum* with delphiniums, and *L. regale* amongst rhododendrons and azaleas. The brilliant cinnabar-red of *L. Davidii* and "Maxwill" is very effective with *Asclepias tuberosa* (Orange Milkweed) or against the red leaved *Berberis Thunbergii atropurpurea.* Thalictrums and columbines, or other plants with feathery foliage, combine well with lilies, and ferns may be used with varieties that like a moist, shady situation. Petunias make excellent ground cover, their flowers forming a pleasing contrast to the lily blooms and continuing to give color to the garden long after the main show of lilies is over.

When buying lily bulbs there is a tendency to choose the largest available, but these will not necessarily give the finest blooms or prove the most satisfactory growers. Firm, solid bulbs of moderate size with plump, closely laid scales are preferable, and the roots should be intact. When buying from an unknown or doubtful source, there is always the chance of bringing in stock infected with virus disease and it is advisable to plant such bulbs well away from any other lilies for the first season, where they can be under observation and will have no chance of spreading the disease. There is no known cure, as yet, for lily virus, or mosaic as it is often called, except to dig the whole plant and burn it. It is thought that the disease is spread by direct contact or by aphids, and a distance of at least ten yards is advisable between clean stock and that suspected of being infected.

It is believed that, fortunately, virus disease is not transmitted through seed, and stock of a great many desirable species may be raised from seed if the grower is willing to wait from two to four years for blooms. Seed may be bought from many ordinary flower and vegetable seed houses, or from specializing lily growers, and as a rule the specialist is more careful to send out fresh seed. Packets are priced at from 5 cents to $1, depending on scarcity and rarity, and usually contain from ten to a hundred seeds. Best of all is home-saved seed, taken from strong, healthy plants, where the flowers have been carefully hand-pollenized to ensure the seed being true to variety. When the seed pods begin to crack open, the seed is ready to be harvested. It should then be dried thoroughly and stored in a cool, dry place until planting time. It is our experience that seed does best sown in the spring, as soon as it is possible to work the ground satisfactorily if planted outdoors, or earlier if sown in flats, in frames or in a greenhouse. Seedlings of most species do best if left undisturbed until the fall of the year following that in which the seed was sown, when they may be set out into more permanent quarters.

Seed sown in the open ground is easiest to care for, but needs shading and careful watering. A good soil mixture is two parts of sandy loam to one part leaf-mold or peat moss, and no fertilizer should be mixed with the soil for the seed bed. The surface of the ground should not be allowed to dry out or cake, and a thin layer of fine peat mulch is helpful for this purpose, but too heavy a covering will tend to encourage damping off of the seedlings as they come through the ground. Lath shades, made up with spaces of one inch between the laths, provide sufficient shade in normal weather and can be covered with muslin or cheesecloth on excessively hot days. The bed should be kept moist but not wet.

Lily bulbs should be treated as perennial plants and kept as short a time as possible out of the ground. If it is necessary to store them for even an hour or two before replanting, they should be packed in damp (not wet) peat moss, or other material which will hold moisture, and covered to check evaporation. Bulbs that have been allowed to dry out will respond to being soaked in fresh water for several hours before planting. On the other hand, if bulbs are stored too wet they may develop undesirable molds, and in this case it is advisable to cut away any "rot-ten" parts and then soak the bulbs for a few hours in a solution of one ounce of mercuric chloride to eight gallons of water, before planting. This treatment is also advised if there are any indications of mites, grubs or centipedes on the bulbs.

Besides the wide selection of better known species and varieties which are suitable for ordinary garden culture, a number of very beautiful hybrid lilies have been introduced in recent years. Notable amongst these are the Bellingham hybrids, raised by the late Dr. David Griffiths at the U. S. Experimental Station at Bellingham, Wash. Dr. Griffiths was particularly interested in crosses between the various Pacific Coast lilies and his hybrids of Humboldtii magnificum, pardalinum and Parryi are quite outstandingly beautiful. Those which were named and offered for sale include "Cyrus Gates," "Peter Puget" and "Star of Oregon," and all are worthy of places of honor in any garden.

The late Prof. J. W. Crow of Simcoe, Ontario, was successful in crossing *L. sulphurgale* and *L. princeps,* thereby producing a new race of magnificent trumpet lilies, of distinct creamy coloring and blooming later than the Regals.

We are indebted to Miss Isabella Preston, expert in ornamental horticulture at the Central Experimental Farm, Ottawa, Ontario, for several of the finest hybrid lilies in cultivation. Exceptionally outstanding are those resulting from crossing *L. Willmottiae* with a *L. dauricum* seedling. These are known as "The Stenographer Lilies," having been named after the stenographers employed in the Horticultural Department at the farm. They are vigorous and hardy, with strong upright stems, luxuriant foliage and large, brilliantly colored flowers, reflexed and facing outwards. Miss Preston is continuing her good work along these lines and has some very promising new varieties which may be ready for introduction shortly.

Mr. F. L. Skinner of Dropmore, Manitoba, has also been doing good work amongst lily hybrids and his "Maxwill" and "Scottiae" are included in many of the best catalogs and price lists.

It is likely that new lily hybrids will be coming on the market more frequently, now that the interest in lilies is increasing. Raising seedlings of hybrid origin is a fascinating hobby and one that can be enjoyed by anyone with "green fingers" and a store of patience to keep on trying new combinations. Lilies of different types do not cross readily and very often the seedlings will be indistinguishable from the seed parent, but there is always the chance of being the lucky originator of an exciting new hybrid, and the field is, as yet, hardly touched.

* * *

Most lawns will be maintained in much better condition if they are raked thoroughly before every mowing. This practice is especially to be recommended for areas which have been seeded to two or more kinds of permanent grasses. It also aids in the elimination of certain small weeds, such as chickweed, veronica and milfoil.

* * *

Approximately 5,000 young plants of azaleas were planted in the beds of the lath houses this spring. They were plants propagated by Mr. Brown in August, 1943, for the Azalea Way project.

* * *

Letter to the Editor

University of Edinburgh,
18th May, 1944.

My dear Friend:

I wish I could give a plain answer to the query on *Rh. Forrestii* and *Rh. repens.* The said plants have puzzled many before Miss Else Frye. When these two first came in as dried material, the paucity of the specimens tended to emphasize little differences. As new collections of them arrived certain of these differences were 'ironed' out but others, even more important, presented themselves & found expression in the vars. of *Rh. repens* & var. *chamaethauma* & var. *chamaethomsoni.* These vars. deviate more from *Rh. repens* than the latter does from *Rh. Forrestii!* What is to be done? Either leave as in the Rhodn. book & not unsatisfactory—or treat all as "*Rh. Forrestii* & its vars. including var. "*repens.*" Were we to begin again the colour difference on the under-side of the leaves would *not* be insisted on—but the variations within *Rh. Forrestii* are such as would be entitled to varietal names!

I wonder if all this is lucid but it will do Miss Frye no harm. She has been getting seeds of Rhodn. from us and will have plenty of problems.

Yours ever,
(s) Wm. Wright Smith.

Winter Care of Lilacs

The Leightons—Roy S. and Gladys M.

JUST about the time that the vigorous spring and summer growing seasons come to a close and you have anticipated getting out of your garden clothes to enjoy relaxation indoors, someone should begin expounding upon the desirability of releasing still more of your energy *now* to do that which usually is let go until next spring. Just to demonstrate what we mean, suppose that we pick up our notebook and journey over to where we have our planting of lilacs. Yes, they seem to be entering into their dormant season and this is good because only nature knows when they will again awaken next spring to display their brilliance and fragrance. It is *now,* not next spring, when we can care for them best. For remember, they are among the first to awaken from winter dormancy and their growth and development is very fast. Lilacs in our climate often start to show flowering bud color in January and February, two of our coldest months.

How Did Your Lilacs Do Last Season?

First, let's check back in our minds to determine how well they did for us last season. You may find it easiest to compare with these ten points:

1. Was your bush too thick and woody?
2. Did it root-sucker badly?
3. Were the blooms small and stunted?
4. Did the plant maintain a good, healthy, dark green color all through the growing season?
5. Did the leaves drop long before the end of the summer season?
6. Were the leaves affected with disease?
7. Does the ground around the bushes get hard and dry out easily during the heat of the summer?
8. Are adjoining shrubs or trees beginning to shade your lilacs?
9. Is the plant rejuvenating itself with new, young wood from the roots?
10. Have you cut off last season's faded blooms?

We now have enough to get started on. Let's take up these above points one at a time.

1. Was Your Bush Too Thick and Woody?

If you have neglected pruning for some time the plant may show a bunchy, crowded, branch effect that is undesirable because, if the crown is not kept open and airy, the interior limbs will not develop properly, which will not only make your bush unsightly, but will also serve as a source of infection from disease. A consistent, yearly thinning-out is very much recommended, although heavy pruning is not advised. If your bush has not been handled this way each year in the past, it will, of course, be necessary to prune heavily. This is best done by cutting the limbs out about a foot from the ground and then lifting out the entire branch. New growth will start at this point. If yearly thinning-out is done, such major operations are not often necessary except to cut out dead limbs or to keep the lilac within a certain limited area.

It is to be remembered that pruning induces new growth and it is upon this new growth that the blooms will appear. To prune best is to do so when your lilac is dormant or without any leaves so that you can see what you are cutting out.

Then, too, the pruning is being done when the sap is flowing downward and painting over the cuts is not as necessary as it is when the operation is done in the spring season. Also, experience has shown that when pruning is done in the spring, it is difficult to do so without knocking off too many flower buds. This is another advantage of pruning at the proper time of year.

2. Did It Root-Sucker Badly?

Almost all own-rooted stock will have this tendency—some varieties much more than others. This is not to be interpreted as a point in favor of grafted plants, which seldom send up lilac suckers, since every one of the suckers from plants on their own roots is true to the parent type. Actually this affords an excellent means of keeping your bush rejuvenated with young, healthy wood. Without new young growth the lilac bush will slowly dwindle away over a period of years.

The easiest time to desucker is in the spring when the new shoots are tender. This may be done with a sharp knife, making the cut below the ground level. If you did not take care of this detail last spring, you will find that the sucker shoots are hard, mature wood by now, which makes their removal a little more difficult. Pruning shears, however, will do the trick, again cutting below the ground level.

It is best to remove all but the three or four closest to the trunk. To be persistent in removing surplus sucker shoots cannot be over-emphasized. When done consistently, it takes but little time.

3. Were the Blooms Small and Stunted?

This is usually caused by leaving too much wood in the crown with the result that you have gained in quantity at a sacrifice in quality. Following the suggestions in No. 1 will force more vigor into the flowering buds for next spring season. When the shrubs have grown tall, avoid lopping off the ends of the branches to reduce their over-all size as this only removes the flower buds and defeats your purpose by producing more growth for next year at the point of each cut. As suggested above, thin out by removing whole sections. Both you and the plant will be better pleased with the results. The "thin-out method" of pruning will also tend to keep the plant blooming all over from top to bottom rather than just at the top, or just at the bottom or side, as many times is the case.

Remember, never fear severe pruning on "own rooted" stock whereas you must never cut out the center trunk of a grafted bush lest you soon find the bush fading badly with nothing left for use in rejuvenating it.

4. Did the Plant Maintain a Good, Healthy, Dark Green Color All Through the Growing Season?

This is the best test of a vigorous, healthy lilac. Yellow leaves will always signify soil depletion. Lilac bushes are heavy feeders and now is the best time to fertilize. Their requirements are little, but proper yearly fertilizing is both beneficial and necessary for a healthy bush, free from disease.

If your soil is too acid, work in a little hydrated lime, but do not overdo it or your plant will show a stunted leaf and blossom. If in doubt, a simple test will show the pH of the soil; 7.0 to 7.5 is about right.

We prefer to mulch our plants with a good barnyard fertilizer at this time of the year in order that it may leach into the soil all winter and be well broken down and ready to be turned under in the early spring months. It will make little difference whether it is well rotted or not because the winter rains will eliminate any danger of burning. Straw, sawdust or peat as a barnyard fertilizer base is to be recommended. In the early spring months, just as growth is commencing, a complete commercial fertilizer may be used. Select one that has a high phosphorus content in relation to nitrogen, which can easily induce too much wood. A proper balance would be:

4%	Nitrogen
16%	Potash
40%	Phosphoric acid

5. Did the Leaves Drop Long Before the End of the Summer Season?

The only reason for premature dropping of leaves is insufficient moisture. If this is the case, the bush is forced into a dormant condition that much faster in order to save itself. Such a condition can be harmful if it occurs before the new flower buds have been formed. If the growing season is dry, liberal watering will be necessary in order that the many surface roots may obtain enough moisture from the soil about the plant. The common mistake is to forget about this point when the summer dry months are at hand. Frequently a section of the bush will dry up, necessitating complete removal later.

6. Were the Leaves Affected With Disease?

A healthy lilac bush generally is little affected with disease, and the best cure for disease is to keep the shrubs healthy at all times. Why not apply a dormant spray now to avoid spring spraying with the risk of not being able to use a strong enough solution to be effective without burning flower and leaf buds which expand so rapidly, so early? Also, it will enable you to get one more job out of the way before next spring.

If you have been using a lime and sulphur spray, try changing to a good dormant oil spray or vice versa. In this way, one is sure to cover the few pests and diseases that are common to the lilac.

Should your plants have been infested this year with disease, be sure to rake up the leaves from around the base and destroy them by burning. This is most important.

7. Does the Ground Around the Bushes Get Hard and Dry Out Easily During the Heat of the Summer?

The ground about the base of your lilac should be kept open and friable at all times. If it cakes, it will burn out easily and seal off normal moisture absorption from both above and below the surface. This will be overcome to a great extent by yearly winter mulching with a good barnyard fertilizer. Water will then be retained instead of running off or away from the roots. Soils thus lightened and made mellow are much easier to work without doing harm to the tender surface roots. Then, too, watering will do good for it will be retained as a storage for surface roots.

8. Are Adjoining Shrubs or Trees Beginning to Shade Your Lilacs?

When lilacs are used in a foundation planting, it becomes a race of survival of the fittest with adjoining bushes and trees. Generally, lilacs will hold their own against almost any aggressor with the exception of already established large shrubs and trees. In this event, it will be well for us to thin out or transplant any tree or bush that will provide too much shade; for lilacs will cease to blossom freely when they become shaded—or else their bloom will be to the top or sunny side of the bush only, thus losing their natural beauty.

9. Is the Plant Rejuvenating Itself With New Young Wood from the Roots?

As mentioned above, it is extremely important to keep new wood developing on lilacs in order to insure the next season's growth. Where certain varieties fail to produce young growths, we must watch carefully over our pruning lest we undo in a few moments that which has taken months to produce.

10. Have You Cut Off Last Season's Faded Blooms?

Now is the time when all of last year's faded blossoms must be removed, as lilacs do not shed their dead blooms, so to speak, as many other plants do. It is needless to say that the gayety of next spring's display will be greatly marred if black, dried-up blossoms are still visible. Likewise, valuable stored-up energy has had to be released for the formation of seeds which have never been used.

In pruning out any faded blooms be sure to cut away only the dried blossoms and not the new growth which has formed just below the truss, for it is on the laterals of this new wood that the flower buds for next year will appear.

* * *

Garden of the Heart

The heart is a garden
Wherein we sow
The seeds of our thoughts,
And there they grow.

It was granted to us
By the Lord, our Maker.
He placed each in charge
As the lone caretaker.

When He comes back
What will He find?
A garden of flowers,
Or weeds, of the mind?

It is a secret garden
And only we know
How the dandelions thrive
Or the roses grow.

Thus let us root up all
Evil thoughts—the weeds
And replace them with
Flowers—kind deeds.

Thus make it worthy
In the Master's eyes
For Him to transplant
Into Paradise.

Miss Shirley D. Zemke,
1210 W. 97th St.,
Chicago, Ill.

The Fragrant Garden

GLADYS FRANCE BAKER

GREETINGS, everybody! Was your garden quite perfect this year? Are you perfectly satisfied with it just as it is, or are you planning some changes or additions for next year? And is it as fragrant as you would like it to be? If it is not, you are surely missing a great joy that should by right be yours, for fragrance in the garden is its soul —and who wants a garden without a soul?

Let me tell you about a garden that I know, a garden with a soul like a saint.

First of all, it has a huge apple tree, an inheritance from the past, a grandmotherly old tree with great arms in which the children may play (two generations of children have played there). Under its branches is space for a tea table and chairs for those who no longer climb, and in the spring the heavenly scent of apple blossom fills the air; in the fall there is the spicy smell of big rosy apples.

Of course, not every gardener inherits an ancient tree, and not every garden has room for one, but most places are large enough for a dwarf tree, or at least for one or two trained flat against the garage, and these flat espalier trees may be bought already trained in several different patterns to fit any space available. In case you do not care for fruit trees at all, there are always the flowering crabapples to choose from, and some of them are almost as fragrant as the orchard trees. Their small fruits are handsome in the fall, the birds like them, and in case you do care for fruit after all, you can make from them a jelly of wonderful flavor. In fact, I have heard Mr. Cecil Solly say that until you have eaten the jelly made from these small Asiatic crabs you have never eaten crabapple jelly at all.

But to return to my garden of delights. Under the tree and spreading out all around is good, smooth grass, and there are wide paths of random stone. Among the stones are little creeping thymes and the wee mint from Corsica, *Mentha Requienii*, and here and there a stone is taken right out to make room for a broad mat of sweet white violet, the kind that lies flat on the ground and turns its little flower faces up to the sky. The ancestral violet was brought from England in a sailing ship in 1840 by a garden-loving Englishwoman who felt that she must take some of the dear home flowers to the new strange land, and from all her garden wealth she chose this small white violet and a clump of lily-of-the-valley, never dreaming that her beloved violet had come originally from the strange land to which she was going. The paths are bordered with pinks, the old-fashioned grass pinks from grandmother's garden that fill the air with the rich spicy scent that no modern pink ever has. Here, where two main paths cross, right in the middle of the intersection, stands the sun-dial. Around its base is a narrow ring of the old, lemon-scented golden thyme, which gives to the dial another motto beside the one graven on its face. Do you hear the motto?—"Thyme Is Golden." The lovely pun is a very old one in English gardens.

There are big lavender bushes nearby and the careful gardener, after she has harvested the flowers, always hoards the flower stems to burn a handful at a time in her winter fireplace. There is no plant more redolent of old memories than lavender, and of this, Louise Beebe Wilder tells a fascinating story in one of her delightful books. It runs like this: She was showing her garden to a friend and, having occasion to return to the house on some small errand, she passed her friend's English coachman standing looking at her lavender bushes of which she was justly proud. As she approached, he turned to her and said quite simply, "Oh, Mrs. Wilder, them bushes take me 'ome." Surely that was a compliment to any woman's garden. The women of ancient Greece loved lavender. They planted it in the little enclosed gardens back of their houses and on the graves of their dead. Perhaps it grew in that garden where Paris and Helen of Troy met in the early morning light.

Not far from the lavender, great lilacs, French hybrids, carefully chosen for their sweetness, are planted near the paths so that you can pull down the heavy heads and bury your face in the cool flowers and breathe in the good warm scent, but no matter how deeply you breathe you can never get quite enough. I can remember that as a child I used to wonder how the lilacs could feel so cool and smell so warm. Other scents that always seem to me definitely warm are heliotrope and wallflower. Near the lilacs a big bed of yellow day lilies, *Hemerocallis flava,* fills the garden with its lemony sweetness. Many fine new day lilies have been developed in recent years but none are more beautiful and few as fragrant as this old favorite. It is essentially for the garden. Indoors the scent becomes too powerful and somewhat rank, but if you care for cut flowers outside, a big jar or basket of them just beside your door will give a golden greeting to your friends, or cheer your own tired heart at the end of a hard day. The Spanish broom, *Spartium junceum,* like the lilies in scent and color but entirely different in form, arranges nicely with them and in good years you may gather its flowers for five months.

There are many peonies, the old red "Piney" with its homely, bitter-sweet smell, and the tall splendors in white and ivory and ruby and rose and wine that are the pride and joy of the specialist. These are lavish of their scent, but not too lavish for it is one of the most delightful of the whole year. There are lovely great single flowers, too, but these are not sweet; indeed, some of them are very ill-scented, but unlike their sweeter sisters they do not shed their scent abroad, so they are placed just a little farther from the path and all is well.

One must be very careful about these things and sometimes very handsome plants have to be discarded altogether because of their evil odor. This is a heartbreaking experience and one that may be avoided if one only has the foresight to do so.

Lilies, especially, have had great thought and care in their arrangement. The lovely white Madonna, *Lilium candidum,* is there in profusion. One could never have too much of it. Do you remember how Beverly Nichols says, "the bells open and chime their scented praise to God. First one bell opens, and rings a hesitant note, then another—till there comes a day—when they are all pealing their chorus in the breeze, and the whole village is drunk with a perfumed melody." This is the lily the Angel Gabriel holds in his hand in the old pictures of the Annuciation, the lily of the old proverb—

"Show me a garden where lilies grow
I'll show you a house where the plague
may not go."

and which Maeterlinck called "the great white lily, the lord of the gardens, the only authentic prince among all the commonalty issuing from the kitchen garden, the ditches, the copses, the pools and the moors—whose nobility dates back to the gods themselves."

At close range the white and pink *speciosum* is sweet with a fresh spicy fragrance as are the buff colored *excelsum* and *Henryi.* Our own wild orange-colored lily may stand close to the path, but the big Gold Bands, Regals, Sargents and Easter lilies are clear over at the back of the wide beds, so that their heavy odors, overpowering at close range, are transmuted by distance into a heavenly incense.

The garden treasures many old-fashioned flowers, among them garden heliotrope or valerian, and this also is set rather far back from the paths.

There are roses, of course, and carnations, all carefully selected not only for form and color but also for fragrance, a grace too often lacking in the highly developed modern kinds of both these garden favorites. The carnations are planted in the borders but the roses are kept rather by themselves shut in by two hedges, one an untrimmed hedge of a semi-double white Rugosa, Blanche Double de Coubert, famous for its old time rose fragrance, and one of Sweet Brier neatly clipped. When the Sweet Brier is wet with dew, or by a little summer shower, it gives off, I think, the sweetest smell this side of Paradise. Do you remember in Roberta Frye Watt's "Story of Seattle" the chapter about "The Sweet Brier Bride?" I hope you do because the plants in this rose-garden hedge are believed to be the direct lineal descendants of that bride's Sweet Briers.

There are old, old roses, too, some of them roses that Shakespeare knew, whose very names are music, and these are set as they should be, with the sweet and friendly herbs about their feet. Nearby are great bushes of rosemary and lavender and clumps of Florentine iris all planted close, where they can drowse off in the hot summer sun and dream of old times and old ways together. There are newer irises, too, in great spreads of color, especially the lovely blues like Ballerine and Crusader, for the owner of the garden thinks these are the most fragrant of all.

There are also many shrubs other than the lilacs; several kinds of *Philadelphus* or mock orange (maybe you like to call it syringa) beautifully placed back of the peony beds. The scented viburnums, lovely cousins of the old-fashioned snowball, *Viburnum Carlesii, V. fragrans,* and *V. odoratissimum.* The escallonias and choisya that smell so good when the hose is turned on them, and daphnes in variety; *D. mezereum,* the February daphne, that is the earliest to bloom; *D. cneorum,* the rock daphne, gayest in color and *D. odora,* the sweetest of all. The gardener is also trying out a few rarer sorts. *D. Genkwa, D. Blagayana, and D. petraea,* the last-named a most delightful dwarf with exquisite pink flowers which are large for the size of the plant. These are still high priced and hard to find but worth it all if you can get them. Growing next to the fragrant daphne and blossoming at the same time and just as sweet is the fragrant skimmia. This is a favorite combination and you will find them paired here and there through the garden.

Then, grown just for their scented leaves are the half-shrubby things like southernwood (or maybe you call it lad's lover or old man) and the sweet fern, *Comptonia asplenifolia,* of eastern roadsides, and the lemon verbena.

Here and there all through the garden are violets of many sorts and lily-of-the-valley and little crested irises, *Iris cristata.* Every October the gardener finds "the first flower of spring," the first purple violet, and, in one shady place, the trailing arbutus of the eastern woods is quite rampantly at home.

There are many annual delights, too—mignonette and heliotrope, sweet alyssum, stocks and wallflowers, and great rose geraniums planted out for the summer.

This garden has many vines, but I shall tell you of only three. First, the great Chinese wisteria trained along the eaves of the house, where the clouds of greyish purple bloom seem fairly to drip perfume into every open door and window. Then two huge vines on the pergola, one of the sweet Japanese Clematis, *C. paniculata,* that is a white foam in September, and the other—well you never *could* guess that one—a riverside grape from the Atlantic seaboard. There are many wild grapes there, but this one, perhaps the very one Lief Ericsson found when he sailed to America so long before Columbus—this one has great umbrella-like heads of small greenish flowers that smell exactly like mignonette. It has the big handsome leaves that all grape vines have and the fruit is small and black and makes a delicious and fragrant jelly. And it might, although I have never tried it, it *might* make good grape juice, that kind of juice of which one of our local poets has so sweetly sung, "You stir a lot of sugar in and let her set and spile." I have always called this vine *Vitis riparia* but Bailey calls it *V. vulpina.*

There are flowers that are fragrant after nightfall, like the night-scented stock, dame's rocket, the fragrant tobacco and even the winter season has its own special treasures like winter-sweet, winter honeysuckle, winter-blooming pansies and Algerian iris, *Iris unguicularis.*

Alas, never could I tell you all the delights of this garden, but I *can* tell you that year by year I am trying to make my own as much like it as may be, for as I told you before, I do truly believe that fragrance is the soul of the garden. And in parting may I leave with you a proverb from the Far East:

"Any man may grow a beautiful flower, but only God gives the fragrance."

Bibliography

"The Fragrant Path" by Louise Beebe Wilder.

"The Book of the Scented Garden" by F. W. Burridge.

"An Artist's Herbal" by Louise Mansfield.

Catalogues of Special Subjects

Schreiner's Iris Gardens—Riverview Station, St. Paul, Minn. Schreiner's catalogue lists all iris in separate color groups, giving rating, height, season of bloom, as well as indicating the fragrant ones.

A. E. Wohlert — 921 Montgomery Ave., Narbeth, Penn. "Rare Wisterias." A 16-page monograph listing varieties, white, pink, rose, dark and light purple, double and single, long and short racemes. Also cultural notes.

Very Valuable

Bobbink and Atkins, Rutherford, N. J. A monograph on old roses collected and for sale by them.

Paramount Nurseries, Plainsfield, N. J. This catalogue lists over fifty violet species, several of them fragrant, and six varieties of sweet garden violets.

Addenda

Among trees, none is sweeter than our native cottonwood. The scent from the young growth as it expands in the spring fills the air for a considerable distance with an incomparable odor, at once spicy and sweet. I have big trees but I think that in even a quite small garden a young tree might be kept in bounds by a drastic annual pruning.

Douglas fir: Occasionally a young tree will be found that sheds a delightful odor both sweet and pungent. At its best when the sun shines on new growth in early summer, it still persists in the old growth. After my firs were topped following the great storm of October, 1934, one proved to be of this fragrant variety. We kept the severed top for our indoor Christmas tree and it filled the house with its heavenly perfume for two weeks, till we finally took it out as a fire hazard. How we missed it!

Summary of Report of the President to the Annual Meeting of the Arboretum Foundation

THERE was a brief review of the progress during the past year in Arboretum activities and a summary given of the various reports made by the director and the chairmen of the various committees. The director's report showed the marked increase in work done due to the legislative appropriation. In addition to Paul D. Brown as field superintendent, the Arboretum has six full-time and a number of part-time employees. A great deal of work has been done in getting the Arboretum grounds in better condition, with special attention being given to Rhododendron Glen and Azalea Way. The report also showed that approximately 5,500 new plants and shrubs had been placed in permanent positions, the larger portion being azaleas and rhododendrons. The director further reported that for the coming year, in addition to moving a large number of shrubs and plants from the nursery to permanent locations, he was planning to do considerable cleaning up of the grounds and replanting in the rock garden section and along Lake Washington Boulevard. His financial report showed the expenditures for the past year as against both the funds appropriated by the state and those contributed by the Arboretum Foundation and an itemized budget covering the coming year. Due to the legislative appropriation to the Arboretum, the grounds and improvements have been placed in much better condition and because of this fact and the added growth of the trees and shrubs, the Arboretum is now being visited by a great many more people.

The president reported that the camellias propagated and raised through the efforts of Mrs. George Williams and her associates were now to be placed in their permanent locations in the Arboretum, the expense thereof to be paid out of the Williams' Memorial Fund. The report of the Bulletin committee made by Mrs. Roy Page Ballard, its chairman, showed that the scope of THE BULLETIN had been broadened to include current activities at the Arboretum and general articles on advanced gardening, scientific work, commercial growing, horticulture, and so forth, including articles covering the growing of plants in Eastern Washington. The Arboretum Unit Committee, under the guidance of Mrs. Carl Ballard as chairman, has continued the holding of meetings for the purpose of stimulating interest in the Arboretum. An Advisory Board has now been created, made up of the chairmen of the various committees and its work has been found to be of great value in planning various activities and in carrying them out. The Acquisition Committee has been merged with the Plant Disposal Committee, under the chairmanship of Mrs. Don Palmer. It holds its meetings at the Arboretum and the various plans for new plantings and improvement of the old ones are gone over with the director and superintendent.

Through the efforts of the Publicity Committee, with Mr. E. L. Reber as chairman, the Arboretum has secured considerable favorable publicity and the Arboretum is now becoming known throughout the United States and a number of nationally known horticulturists have advised us of their interest in the Arboretum and have aided by writing articles for The Bulletin.

The president further reported that an endowment fund had been established whereby all donations of monies or securities or proceeds of life insurance policies where the Arboretum Foundation is the beneficiary are placed in the hands of the Seattle-First National Bank as trustee, the monies to be kept invested and the income used for Arboretum purposes. It is hoped to secure as large a permanent fund as possible in order to supplement the appropriations made from time to time by the legislature. There is no limit to the amount that can be profitably expended in developing new plantings and properly maintaining the Arboretum. It must not be forgotten that the Arboretum is a state enterprise and will benefit the state as a whole. It is our task to cooperate with the University authorities and to do everything possible to aid in developing the Arboretum and seeing that it is properly developed and maintained.

Membership Drive

THE ARBORETUM FOUNDATION is pleased to announce that during its fiscal year, from June 1, 1943 to May 31, 1944, the largest number of paid memberships in its history was received. Certainly that is an excellent forerunner of the accomplishments we will be able to attain in the peaceful days to come.

A membership drive is being planned to begin in the fall, the details of which are now being worked out. We have been assured the enthusiastic cooperation of various garden organizations and it is within this group that a membership contest will be conducted. Every garden club throughout the state will be invited to participate. The contest will be segregated into various classifications, according to the size of the club, making each organization, large or small, eligible for the plant material awards which will be presented to the winners of the contest. Contest details will be mailed directly to the garden organizations.

We expressly invite any individual or organization that may wish to help us conduct this drive to contact us, either by telephone or mail, at the Foundation office.

Ida Schibig, *Membership.*

* * *

The common furze or gorse, *Ulex europaeus,* is not a tidy garden shrub and its spines are distinctly unfriendly, but it has, when in bloom, a delicious fruity scent that no other plant quite matches. Years ago there was a great clump in Volunteer Park and on fair spring days when the wind was right I used to enjoy the scent in my own garden three blocks away.

—Gladys France Baker.

* * *

Letter to the Editor

I am glad to learn from your letter that the State of Washington has started to recognize the efforts you are making to establish an arboretum in that part of our country where the conditions are ideal for one. It took the Atlantic Coast two hundred and fifty years to decide they needed one but with your climate and our money what a fine place we would have produced.

Wm. H. Judd,
(Arnold Arboretum)

The Arboretum Bulletin

VOL. VII, No. 3 SEATTLE, WASHINGTON SEPT., 1944

Editor .... JOHN H. HANLEY

ARBORETUM FOUNDATION
OFFICE HOURS
9 a.m. to 12 m., Monday through Friday
Phone SEneca 0920

Special Notice

To keep memberships in the Arboretum Foundation in good standing, dues should be paid during the month payable. Memberships more than three months in arrears will be dropped and the BULLETIN will be discontinued.

Arboretum Membership Blank

☐	Active	$ 5.00
*☐	Contributing	10.00
☐	Supporting	25.00
☐	Sustaining	50.00
☐	Sponsor	100.00
☐	Life	500.00
☐	Endowment	1,000.00

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516 Medical Arts Building
Seattle 1, Washington

I hereby apply for membership in the Arboretum Foundation and remittance for same is enclosed to cover dues for the next succeeding 12 months.

Name ....

Address ....

All memberships are non-assessable.

---

*Garden Clubs—Affiliated membership $10.00 minimum.
Special rate privileges to members of Affiliated Garden Clubs and Arboretum Units.

New Membership Schedule

The Arboretum Foundation Board of Directors passed a new schedule of membership classifications as listed above. This schedule has the following exceptions:

a. That members of Garden Clubs affiliated with the Arboretum having a membership of not less than $10.00 shall be entitled to a $2.00 or Associate membership.

b. That members of Arboretum Units shall be entitled to a $2.00 or Associate minimum membership.

c. This schedule applies only to new memberships.

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Howard W. Parish	Vice-President
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WASHINGTON STATE FEDERATION REPRESENTATIVES

Mrs. Walton W. Howard
Mrs. Harry L. Stinson

* * *

Minutes of Annual Meeting

June 2, 1944

THE annual meeting of the Arboretum Foundation was held on June 2, 1944, in the Auditorium of the Women's University Club.

The meeting was called to order at 8:30 p. m. by Mr. Thorgrimson, president.

Mr. Thorgrimson thanked the Seattle Amateur Chrysanthemum Society and Mrs. Franz Nehammer, as chairman of the decorations committee, for the lovely flower decorations.

Mr. Thorgrimson introduced Dr. T. C.

Frye, a member of the University of Washington Arboretum Committee, who gave the introductory address. Dr. Frye stressed the problems of maintenance and management of the Arboretum.

The minutes of the previous meeting were read by Mrs. Schibig, secretary. Minutes approved.

The president gave his annual report and highly commended the various standing committees for their splendid work throughout the year. In particular he commended the Bulletin Committee under the chairmanship of Mrs. Roy Page Ballard. Mr. Thorgrimson said that THE BULLETIN has gained widespread notice and is one of the Foundation's strongest factors. The president also reviewed the report of Dr. John H. Hanley, director, which gave much detailed Arboretum information. The Camellia Memorial Planting for Mrs. George T. Williams was reported on.

The treasurer's report was read.

A proposed change of by-laws by the nominating committee was read to raise the number of Seattle board members from forty to fifty. A motion was made and carried raising the number of Seattle board members to fifty.

A report of the nominating committee was read. Those whose terms expire at the end of the current fiscal year were proposed for re-election.

M. M. Chism
Don G. Eggerman
Herbert L. Collier
Mrs. Stuart Frazier
Herbert G. Ihrig
Maurice Jackson
Mrs. Arthur J. Krauss
Mrs. Alex McEwan
Walter A. Moore
Reginald H. Parsons
P. B. Truax
Mrs. James W. Wylie
Mrs. Harry L. Stinson
Mrs. Chas. L. Harris
Mrs. Roy Taylor
Mrs. Walton W. Howard

A motion was made and seconded that nominations be closed and that the secretary be instructed to cast an unanimous ballot. Carried. An unanimous ballot was cast.

Mr. Frank Drake Davison lectured on "An Appreciation of the Arboretum."

There being no further business the meeting was adjourned.

Respectfully submitted,
IDA SCHIBIG, *Secretary.*

* * *

We take pleasure in welcoming members who have recently joined the Arboretum Foundation:

Mrs. Hamer Bergren
Mrs. S. W. Bretharst
Mrs. Laren G. Brawn
Mrs. J. N. Cunningham
Mrs. Herman Friese
Mrs. J. Gordon Gase
Mrs. G. M. Johnsan
Miss Olga Jahnsan
Mrs. Frank Killien
Jane Marsh
Mrs. Wm. Mera
Ben F. Nelsan
Northeast Garden Club
Haward W. Parish
Mrs. F. A. Pelligrini
Miss Julia Shaurek
Mrs. Ben F. Smith
Mrs. L. D. Stokes
Mrs. C. I. Angeles
Banneybraak Nursery
Mrs. Edw. A. Bourassa
Evergreen Cemetery Co.
Mrs. L. J. Francke
Hazel Rass Fritz
Rev. Perry E. Gresham
Mrs. Jahn Kennedy
Mrs. J. W. Walton
Mrs. Martha Watsan
W. Walter Williams
Patlatch Yards Inc.
The Seattle Star
Miss Maud Reeder
J. Henry Gille
Mrs. Rabert Lester Hacker
Narman M. Littell
Washington State College

It is our special pleasure to welcome Unit No. 6 from Snohomish, Washington, and Mrs. Albert Steuber as chairman.

* * *

Your Arboretum Membership

LOOKING back over the developments and changes that have taken place at the Arboretum since the beginning of the project in 1933, and comparing the conditions which existed in those early days with the situation as it is today, one cannot fail to be impressed by the original wealth of our enterprise as expressed in terms of the funds that were available for furthering it. Both the state government, in 1933 and 1934, and the federal government, from early 1935 to July, 1941, made overwhelmingly generous outlays of cash, principally for the hiring of labor. Some appreciation of the extent of these outlays can be gleaned from the fact, that, during the 1939-1940 fiscal period, the number of workers averaged 220 for each working day.

As a consequence of such lavish expenditures, the Arboretum advanced in rapid strides and fortunately much basic, fundamental, and absolutely necessary, ground work was established. From much of it the Arboretum will derive great benefit for all time and all you who have been vitally interested—you who have been able to envision the full possibilities and import of an arboretum in the Puget Sound country—can take great pleasure from the knowledge that you have helped bring it to pass.

Beginning in July, 1941, the Arboretum entered an entirely new phase. For almost two years there was very, very little money available to do our work. In April, 1943, a fair sum was made available from state funds and this, augmented by a monthly appropriation from the Arboretum Foundation, will have to suffice until a new appropriation for the 1945-1947 biennium is provided. However, there is a marked contrast between the lavish provisions of the W.E.R.A.-W.P.A. period and the rather meager allotment of the present. This is not to say that we should return to such a period but only to impress the two points, namely, that it has not been impossible to maintain the rapid progress of the earlier period and that very advantageous and proper use could be made of additional funds now.

The above account is somewhat bald and barren in that it fails to present in its proper light the important part that your membership has played in the development of the Arboretum. Even in the lush W.P.A. era it was necessary to make substantial cash outlays in order to uphold the sponsor's end of the agreement. Actually, it was necessary to invest, in one form or another, $2,500.00 for every $7,500.00 that the government contributed; the Foundation funds were the only monies available for the sponsor's share. Hence, had it not been for substantial and continued support, through membership in the Foundation, the Arboretum would have long since ceased to exist.

The foregoing statements present only one part of the picture. There is now, and will continue to be for some time to come, a constant need for funds which can only come through individual subscriptions to the Arboretum Foundation. Many people, when they are invited to become a part of the Foundation organization, will ask, "Well, what do I get for my money?" There are a number of answers to the question and when you add them all up they give a total which can justify any amount in the present membership classification.

The most tangible asset to the Foundation member, the ARBORETUM BULLETIN, is, after all, the least important in spite of the fact that there has been constant improvement in it under the guidance of such outstanding members as Mrs. Roy Page Ballard. It is now a good quarterly publication; the time may come when it will be a good monthly periodical. If and when such a time comes, the BULLETIN, the most tangible return on your membership investment, will still be the least important.

After all, your dollar is contributing to the enlargement and enhancement of a 267-acre tract called the Arboretum which, as the years go by, can become known throughout the world; it can become a mecca for gardeners, plant scientists, naturalists, and just plain everyday laymen who find in it not only a great deal of peace and quiet, and harmony, but also a maximum of unsurpassing beauty. Your dollar is building a permanent monument — a monument to your foresight—a monument to the whole of the Pacific Northwest.

* * *

Among Our Contributors

MRS. GLADYS FRANCE BAKER is right in her element in the preparation of such an article as "The Fragrant Garden." That subject calls to mind old-fashioned plantings wherein herbs played a more prominent part than is usual today. Mrs. Baker has applied her abilities for keen observation to the development of gardening in the Puget Sound region and has previously followed that up with excellent written accounts of the early gardens of this section. Furthermore, she has created at her Juanita Beach home a garden of her own, one of great beauty, in which she has included a number of plant species not ordinarily encountered in the Northwest. Some of them she mentions in connection with her discussion of the fragrant garden and by virtue of her personal experience with these types you can be assured that she speaks with the authority that comes from long experience and intelligent observation.

* * *

Plantsmen of the Northwest, when they encounter difficulties of either nomenclature or culture among ornamental plant species, are wont to call upon Carl English, Jr., for his opinions as a final authority. Such is the reputation that Mr. English and his wife have built up here in the Puget Sound region. Because of his standing as an authority on plants we feel extremely fortunate in being able to present in this issue of The Bulletin his excellent discussion of "Ericaceous Plants in Northwest America." We know you will enjoy reading what he has to say about the various natives that are included.

* * *

As usual we are carrying material from the pen of Mrs. Else M. Frye. It is almost sufficient to say only that much, because, as our readers well know, it would be extremely difficult to find any author in the Northwest, or anywhere in the country for that matter, who could so completely satisfy our desire for information on the culture of those garden plants which are of particular value here. Mrs. Frye has written beautifully about the two genera, Gaultheria and Pernettya. What she writes is the culmination of years of handling both subjects.

Incidentally, if any of our readers want to see something thoroughly new and most interesting in the culture of acid-loving plants, you should visit Mrs. Frye's garden and examine the artificial bog which she has created for a number of her pets.

* * *

The Dove Tree, *Davidia involucrata,* has not been easy to grow in its assigned area at the Arboretum. Knowing that Mr. William Judd of Arnold Arboretum had worked with the species for years and had had occasion to observe its performance in various parts of the world, we approached him with the idea of expressing his views on both the propagation and culture of the species. The result is the excellent article under the title of "Davidia Involucrata." Our last correspondence with Mr. Judd indicates that he will not be able to visit with us, as has been his habit in the past, until after the war. It is our hope that when he is able to come again many of our readers will have an opportunity to hear his lively dissertations on plants and plantsmen of the world.

* * *

Our readers will recall with great pleasure the article on lilacs by Mr. Roy S. Leighton, which was published in the last issue of The Bulletin. Feeling that it would be wise to give continuity to the subject of lilac culture, the Bulletin Committee approached Mr. Leighton to ask for a supplementary article on fall and winter care of lilacs, an article which would round out the picture, so to speak, of lilac culture. We were most happy when both Mr. and Mrs. Leighton agreed to the preparation of the additional material, and know that all of you will profit by what they have written. Most students of ornamental plants and gardening feel that lilacs could be used much

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more extensively in the Northwest, and it is our hope that the Leighton series will stimulate their use. We are glad to learn, too, that the Leightons will soon be offering some of their fine varieties for sale.

* * *

Residents of Central Washington, as well as visitors to that section, speak with high praise of the interesting gardens developed by Mr. and Mrs. H. F. Ohme of Wenatchee. On a prominent headland, high above the Wenatchee Valley, and with a sweeping view of the lovely country below it, they have developed a garden spot of outstanding beauty, with open spaces here, and secluded, protected nooks there. In her article, Mrs. Ohme gives a vivid and fitting description of the history and details of the development.

* * *

There was a time when the commercial culture of a wide range of lily species was an important industry in the Pacific Northwest. It is entirely possible that we are now witnessing a rejuvenation or revival of that industry. There are a number of prominent lily growers in the Northwest and, particularly in Western Oregon, there are large acreages of lily bulbs being grown for the forcing market. Among the growers of a general line of lily bulbs, the name of Beatrice Palmer of Vancouver Island stands high. Because of the potential importance of the lily bulb-growing industry, as well as because of the timeliness of a discussion of lily species and varieties, we are most happy to present Miss Palmer's opinions of them.

* * *

The Ellensburg Garden Club has always impressed us as being a particularly active one insofar as its interest in and work toward the development of the Arboretum are concerned. Several of its members have contributed to THE BULLETIN in the past and we are now happy to carry another discussion, this time by Mrs. Claude Reynolds, a prominent member of the Ellensburg Club, on one of her favorite subjects—chrysanthemums.

* * *

Dr. George B. Rigg of the Department of Botany at the University of Washington has spent virtually his whole life studying plants of the seas and plants of the bogs. In previous discussions in our BULLETIN he has presented helpful information on the latter. Now he develops a very timely, as well as a very important topic in his article entitled "Plants of the Sea in Peace and War." We feel sure that our readers will be amazed at the important part which the plants of the sea are playing in our peace-time and war-time economy. You will find his article not only presented in his usual well-written style, but also interesting to any plantsman, even though he or she may never have the occasion to attempt to grow or use any of the species discussed.

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Gaultheria and Pernettya

ELSE M. FRYE

THE words—coriaceous, leathery, shining, lacquered, lustrous, dark, evergreen, hard, glossy, strongly or deeply veined—when applied to foliage immediately conjures up in my mind something very beautiful. Then, whether the leaves are hung on a low or tall, spraddly or erect skeleton structure is immaterial, quite. I know I want it in my garden.

These descriptive terms apply exactly to the various species of *Gaultheria* and *Pernettya.* All of them have the little urceolate bells, usually white but often pink or pale peach and often glandular. They occur singly, in which case they may be larger, or in short or long racemes.

Those of us who like to grow rhododendrons may find the gaultherias and pernettyas to be splendid auxiliary plants. The tall rhododendrons are often inclined to be leggy or have their lower branches well off the ground. Their nakedness can be covered and the ground kept cool by having species from these genera growing among and under them.

Human kind is subject to a strange hypermetropia—we seem to see and observe best—and treasure most—the plants from the far corners of the earth and pass by with utmost indifference the beauty easily within reach. I am thinking now particularly of our own *Gaultheria Shallon.* More than once visitors have brought in a sprig plucked from our wall to ask the name of this lovely thing. It is common throughout this Northwest Pacific region and will grow both in the open and in the dense shade of the Douglas fir forests. It will bend before constant wind but survives it. It was David Douglas, himself, who first brought it to England in 1826 and the English have learned to esteem its accommodating ways. The leaves are very dark green, sometimes four inches long and half as wide, heart-shaped at the base and tapering to a point. The pink glandular urn-shaped flowers are borne in racemes; the fruit is black. On the Olympic Peninsula coast it grows in thickets six feet tall or more but oftenest it is 30 inches or so. It is not easily transplanted from the wild but comes easily from seeds.

In this same region but well toward the summits, both east and west, we may find *Gaultheria ovatifolia,* a quite prostrate ground-covering shrub. The overlapping, close branches always make a distinctive pattern which is immensely decorative. Its leaves are shaped like those of *Gaultheria Shallon* and of much the same thick green texture, but smaller. It is a very handsome dwarf shrub but not the easiest one to tame. When a pelt of it can be skinned off a rock, intermixed with *Cornus canadensis* and *Rubus pedatus,* and planted in the garden intact we have something very special before which comments and criticisms fail.

On the east side of the summits and in the Rockies as well grows *G. humifusa.* The plant reaches to just a few inches, not more than four. The branches are erect, the leaves paler and thinner and smaller than those of *G. ovatifolia.* The fruits of both are red, but I have not seen them quite generous either in the mountains or when brought to lower levels. In their native habitat they make a perfect turf; at home they are more demanding. They should be planted very firmly in the ground and in half a year's time they will begin to show growth.

The genus was named after H. Gaulthier, a French naturalist and physician in the court of Quebec. The species of that region is *G. procumbens,* which extends as far south as Florida. Probably Dr. Gaulthier found the oil of wintergreen which the plant contains very useful in his simples. This plant is prostrate and stoloniferous and bears its leaves in semiwhorls at the ends of branches. The leaves are very attractive, both summer and winter, at which season they take on a dark crimson hue. Once established in the garden — it takes from half to a year's time — it blooms and fruits well.

From Asia we get some of the most spectacular plants of the genus. *G. Veitchiana* is one that I like very much—a low-spreading evergreen which widens continually by branches from the base. The evergreen leaves are narrow and pointed with conspicuously depressed veins which add much to the beauty. It is very free-blooming, the flowers being borne in narrow racemes and the fruit a bright indigo-blue in color.

G. Miqueliana is one of the best ground covers that I know. The leaves are especially attractive—oval, the netted veins very distinct, all dark green and leathery. The white fruits are said to be edible but who would be mean enough to devour even one!

G. Wardii is distinctive because of the burnished-gold down and bristles which cover the stems and young leaves. The fruits are blue and are covered with a blue bloom. This is not so hardy as some *gaultherias,* as least not until it is some size and well established. I have only a very few left that escaped my ruthless hands after our hard winter of 1942. During that ordeal they died to the base but would have come from the root if left alone, I am now convinced.

I was not so fortunate with *G. nummularioides*—not one of them escaped me. It is quite prostrate, rooting from the reddish branches which are beset with small heart-shaped leaves of coppery green, the whole clothed with reddish hairs. It would be most happy on a rotting log or stump—its ways are not unlike those of *Linnaea borealis.*

A small bushling with shining leaves is *G. cuneato.* The young shoots are red; the leaves thick and dark green; the fruits abundant and white. With me it grows most vigorously in the sun, provided it has cool but well-drained soil.

G. trichophylla is one of my most costly plants for the simple reason that life on the conditions I offered was absolutely not worth the effort. I now have one in a little private scree—my last resort. It grows to five or six inches and is supposed to "quickly" form a wide mat! The leaves are small and lustrous, hairy on the margins. The fruits are very large—one-half to three-quarters of an inch long, waxed and a lovely cool violet to my eyes. I have yet to read one description which does not call this color a blue of some sort.

There are many gaultherias in Australia and New Zealand. *G. antipoda* is a wiry little shrub, the small oval leaves a lacquered brown-green. The flower clusters are erect and remain so in fruit which may be red or white. The plant seems to suffer visibly in cold but does not die.

G. hispida is one of the most handsome—erect, with narrow pointed leaves, conspicuously patterned by the veins. The fruit is white.

The genus *Pernettya* was named after Antoine Joseph Pernetty, who accompanied Bougainville on his famous voyage to South America. *Pernettya pumila* is the type species—I have yet to see that. *Pernettya mucronata,* also, is from the Straits of Magellan region. This plant is too well known to require any description or mention of its garden value. Many of the plants of *P. mucronata* are dioecious and to have abundant fruit it is necessary to have at least one staminate plant in the group.

P. M. Bell's seedling is a very handsome variety, more dwarf and sprawling than the species. It bears enormous crimson fruits which persist well into spring.

P. rupicola is thought by some botanists to be a variety of *P. mucronata.* However that may be, it is almost vining in habit, sprawling on the ground, its branches taking root. Its young growth is very attractive — crimson stems and thick, small-toothed leaves of dark green. The fruits are one-half inch across and cream colored.

Pernettya sp. *Comber* is a comparatively late arrival discovered in the high Andes by Mr. H. F. Comber and introduced by him. It is a wonderful little bush for rock garden or ground cover purposes — not exceeding six inches and widening by stolons. All the branches are beset with small dark leaves with entire margins. The fruit varies in color—almost black, red, white and pink.

P. tasmanica gives me a great deal of pleasure. It forms a very low turf, not an inch high with tiny bright green leaves on which lie all winter bright fruits frosted white or cherry-red which are supported in a star-shaped calyx which has become fleshy and is of the same color as the fruit itself. It is an exciting little plant. It is quite possible to raise an argument as to whether *P. tasmanica* and *P. nana* are identical. Hooker thought them so; Brian L. Burtt and Sir Arthur W. Hill in their monograph think otherwise.

Pernettya macrostigma, at one time called *Gaultheria perplexa,* is a tangle of wiry branches with small narrow coppery toothed leaves. The flowers are small and white but numerous and the plant is most decorative in the winter when it is behung with grooved cherry-red fruits.

The reason I am writing about the two genera together is that in the wild they hybridize and give rise to some very beautiful compact free-blooming shrubs. They have been named Gaulnettya—there are several of them:

Gaultheria antipoda x *Pernettya macrostigma*
Gaultheria depressa x *Pernettya macrostigma*
Gaultheria Colensoi x *Pernettya macrostigma*
Gaultheria rupestris var. *parvifolia* x *Pernettya nana.*

At the Wisley Nurseries, England, our own *Gaultheria Shallon* has been hybridized with *Pernettya mucronata.* The resulting plant has been called *Gaulnettya wisleyensis.*

Gaultherias and *Pernettyas* are often grown in shade which compensates for any lack of miosture. It is possible we could keep them more compact and force a greater production of fruit if we brought them into the sun. But, in such positions it is necessary to provide sufficient moisture and ample drainage.

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Davidia Involucrata

William H. Judd

CHINA has donated to the gardens of Europe and America many beautiful and ornamental flowering plants among which one of the most remarkable is the "Dove Tree," *Davidia involucrata.* The first trip to China made by the late Dr. E. H. Wilson in 1899 was mainly for the purpose of collecting seed of this tree for the nursery firm of Veitch at London, England.

The species was first discovered by a French Roman Catholic priest by the name of Pere David in 1869 and later in 1877 another priest by the name of Pere Farses sent seed of it to the nursery firm of Vilmorin in France from which one single plant was raised in 1898 at Les Barres. From this tree one or two cuttings were eventually rooted and one plant produced from a layer. One rooted cutting was sent to Kew Gardens at London, another to the Jardin Des Plantes in Paris while the layered plant was sent to the Arnold Arboretum at Boston. The writer had the pleasure of seeing the plant at Kew Gardens flower for the first time in 1912 and also the one at the Arnold Arboretum in 1931. The tree at Kew produced fruit from which others were raised, and the two following years it again flowered and fruited only to be then killed to the ground by a severe winter from which it never completely recovered. Moreover the flowers were few and unattractive to the casual observer. The two large bracts are the conspicuous part of the "flower." They are of unequal size, the largest being about six inches long by three inches wide, and the smaller one about half as long and almost as wide as the larger one. They are delicate in texture, at first green, eventually turning pure white, and finally brown with age. As a poet might picture it, they flutter in the breeze like the wings of a dove. However, at the Arnold Arboretum, the climate is too cold for us to have any success with this species. The bracts were poorly developed and remained greenish in color and difficult to distinguish from the foliage.

This tree is extremely rare in cultivation in the United States. I have for over twenty years been familiar with one in a garden at Newport, R. I., which is perfectly at home there, flowering beautifully every year, and and producing plenty of good fruit. There were, some years ago, several on an estate at Jenkintown, Pa., which I have reason to believe were moved and died as a result.

The propagation of the tree has not been especially easy except from seed. Branches near enough to the ground root from layers quite readily but these are only produced from a tree which has been killed to the ground or deliberately cut down. Cuttings have always been difficult to root both by the ordinary methods as well as when treated with chemicals and in my experience only about 25 per cent will root in either event and after doing so are difficult to handle. By far the easiest and most successful method is from seed, planted as soon as ripe in the late fall. The fruits are about the size of a black walnut and are surrounded with a similar hard fleshy pulp. This should be removed, before planting, with the help of an old knife. It will not stain the fingers in so doing as do

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walnuts. A very hard fruit is then exposed, pointed at both ends and deeply furrowed. For some years I was under the impression they would not germinate unless subjected to freezing but I have since discovered this is entirely unnecessary. If planted in flats or pots of regular potting soil in December, I find they do equally as well when kept during the winter in a cool, light, airy pit house where the temperature ranges most of the time between 32 degrees and 42 degrees Fahrenheit. In spring they are removed to a shaded frame outside for the summer, returning them again to the pit in late fall. There, during the following March or April, the majority of them will germinate, having thus required about fifteen months. They should never be kept continuously in a warm greenhouse after planting nor should the soil be allowed to dry out at any time. As soon as they are three or four inches tall they should be potted and eventually lined out in a nursery row under a lath screen. Since 1923 the writer has had the pleasure of raising and disposing of over three hundred plants. Since visiting the Pacific Northwest in 1940 to discover how much at home they appear to be in that temperate climate, over one hundred plants have been sent to that favorable location where in years to come we may have the pleasure of seeing many of them flower.

I would suggest reading the last chapter of "Aristocrats of the Garden" by Ernest H. Wilson where the fascinating story of *Davidia involucrata* and its introduction is so vividly told.

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Hardy Chrysanthemums

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IT IS not difficult to grow choice chrysanthemums in the colder sections of the country. Some of the hardy hybrids developed for use in the extremely cold sections are fine enough to be used anywhere. Mr. Alex Cumming of Bristol, Conn., and Mr. F. L. Mulford of the U. S. Department of Agriculture have developed many hardy early blooming strains. One group, the Minnesota chrysanthemums, begins to bloom in August. Prof. L. E. Longley of the University of Minnesota is searching for still earlier strains. The Chicago strain of hardy chrysanthemums developed by Dr. E. J. Kraus of the University of Chicago is especially colorful, ranging from white through many shades of yellow, orange, rose pink and garnet red.

In Central Washington, the early English varieties are in high favor because of hardiness, large flowers, earliness and long blooming habits. Although the Rayonantes, Patricia Grace and the white and other decoratives seldom have a chance to bloom on the plant without frost injury, the flowers develop nicely if the buds are gathered before they are frost bitten and placed in a cool, light place.

By the end of the season many of the crowns and roots will be found to be very near the surface. For winter protection, draw soil or light fine earth up around the crown as a top dressing before other materials are used for mulching. In the spring this mulch should be removed gradually and not too early, since the tender young growth is easily killed by frost, thus undoing all previous efforts to have them come through the winter in good condition.

A new wrinkle in chrysanthemum culture is growing them from seeds, enabling them to be used in very large massed plantings. An example of this use is pictured in *Horticulture* on page 120 of the March, 1944, issue. The plants shown here came from seeds presented by Mrs. Albert D. Lasker to the New York public parks to be grown as memorial plantings. Quoting from *Horticulture*: "The idea is rapidly gaining favor everywhere for keep-

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* * *

Some Worthwhile Flowering Shrubs

DURING the past season there have been many beautiful types of shrubs in bloom at the Arboretum. The following three have been particularly good: *Cytisus Battandieri, Escallonia Langleyensis* and *Rhododendron cantabile.*

Cytisus Battandieri is a lovely, open-headed, small tree, bearing abundantly of elongate heads of golden yellow, pea-like flowers in June and July.

Escallonia Langleyensis is fine textured and delicate, especially if the light-pink flowered form is used.

Rhododendron cantabile is one of the best of the Lapponicum series. Flowers of rich, intense purple are its forte.

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ERICACEOUS PLANTS

(Continued from Page Eight)

minus, the mountain cranberry, or the American form of the lingenberry. It is an excellent, low, ground cover that spreads fairly rapidly.

For color, *V. parvifolium* with its scarlet berries in July and August, is a thing of beauty. This four- to six-foot shrub should not be overlooked in woodland plantings. Of the western species valued for culinary excellence, I consider *V. deliciosum* of the mountains meadows to be the finest of all and *V. membranaceum* of the mountain woodlands next in taste.

Viewing the Ericaceae as a whole we see it as a family that has wide appeal because it includes a large number of highly ornamental subjects that offer a generous assortment of color, texture and stature to satisfy the various needs of the garden; because our soil and climatic conditions are ideally suited to the growing of a large part of this group; because its members are easily grown and having fibrous root systems, transplant easily; and because these handsome, woody plants grow to form a pleasing and permanent year round display in the garden.

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Ohme Gardens

Mrs. H. F. Ohme

THE Ohme Gardens are but a few minutes' drive from the city of Wenatchee and are located on a high promontory overlooking the entire Wenatchee area.

The panorama from this point, with the city far below nestled alongside the mighty Columbia River and completely surrounded by verdant orchards, the snow-capped Cascades rising in the background, is one not soon to be forgotten. One drives to the gardens on a gradual incline from the west, and on reaching the summit, is amazed at the wonderful view.

In the immediate surroundings we find ourselves amid a rugged and picturesque display of sedimentary rock, part of an ancient sea bed which in ages past, in the times of a gigantic upheaval, was raised to its present level. Extending past us are evidences of a huge fault in the rock mass creating a channel which melting glaciers and the Columbia River on their way to the sea have greatly enlarged. Looking off across the river to the east, one sees high basalt walls rising perpendicularly to great heights and showing evidence of five distinct lava flows. This lava deposit is part of one of the largest volcanic deposits known, extending from north of the Canadian line south through Washington and Oregon into Northern California. To the west the majestic Cascades rise to an elevation of 9,000 feet, and below is a "Garden of Eden"—the Wenatchee Valley, a lush green carpet of thousands of fruit trees with a winding river and a delightful little community in its center.

The setting in this vicinity has been likened to the little principality of Lichtenstein in the European Alps. Here, it is the Columbia River in place of the Rhine, the Cascades instead of the Alps, and Ohme Gardens the site of the prince's palace where he rules supreme.

In the spring of 1929, the Ohme family bought a 40-acre tract of sage-covered land, bordering one edge of orchard-covered valley, for the purpose of having an orchard of their own. The tract did not appear very inviting. It was just a pile of rocks in the eyes of most people, but there were about 15 acres of it that were suitable for fruit growing. This area where the orchard was to be had to be cleared of desert vegetation and cultivated, then a pumping plant and pipe lines for the distribution of water were installed and, finally, the trees were planted. When this was accomplished, the Ohmes had time to look over the rest of their holdings. It would be difficult to describe the feeling of elation that came over them when they found what a real treasure they had in that which they had considered just a pile of rock and waste land. Naturally the first thought was "What a place for a home." Built of the nearby stone so as to blend with its setting and surrounded with suitable trees and shrubbery, this dream home seemed a picture—perfect.

Financial circumstances at the time would not permit the fulfilment of this dream, and the depression years that followed did not improve matters much. But the mountains were full of the landscaping material needed and free to those willing to go there for it.

The Ohmes are one in their liking for nature "as is." Having a little mountain of their own, they wondered if it would not be possible, having the water to use, to have it forest-clad in the midst of the desert. In this way they could play at their hobby and at the same time be developing a setting for their future home. There have followed hundreds of trips to the mountains and on each return trip the old car has groaned under the load of plants it carried. Approximately 500 evergreens are growing throughout the grounds and in this collection, we believe, are all the native conifers of the Northwest, including five varieties of pine, three of fir, two of cedar, two of hemlock, spruce,

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larch and yew. Numbers of native shrubs, sedums and other native rock plants and ferns are growing here and there, with cultivated sedums, thymes and many other plants in keeping with the general theme. Too, there are several large areas of lawn which blend in and give the effect of mountain meadows.

The response of all these native plants to their new environment is very gratifying. In most cases, they become more lush and sturdy-looking than those in their native situation.

On stepping from the car, one enters the gardens across a big lawn and makes his way from place to place on paths and over cascades of stone steps, and on seeing it all, returns to where he entered.

In wandering along the meandering paths, one finds rustic cabins with massive stone fireplaces, numerous interesting view points, hidden nooks, outdoor fireplaces and a miniature lake. This lake is situated at the base of a huge rock mass towering above the water just as nature would have left it. Surrounding the pool, trees, shrubbery and rockery plants blend in a complete picture.

The outdoor fireplaces are in nooks upon which one comes unexpectedly, and these fireplaces with rustic furniture grouped around them make comfortable locations for outdoor picnics for which the Ohmes do occasionally have time.

At one point in the garden one has an unusually pleasant experience after the heat and glare of the sun has given place to the evening shadows. The setting is a rugged rock situation, with a fireplace, table and seats, all of stone, out under the stars.

At the lookout pavilion, which is at the highest point in the garden, there is an unobstructed view in all directions as far as the eye can reach. There a decided feeling of exhilaration comes over one and yet gradually this sensation is replaced by another—the insignificance of the individual in the grandeur of the universe, such a feeling as the Psalmist David must have had when he watched his sheep on the hills of Palestine and composed his songs.

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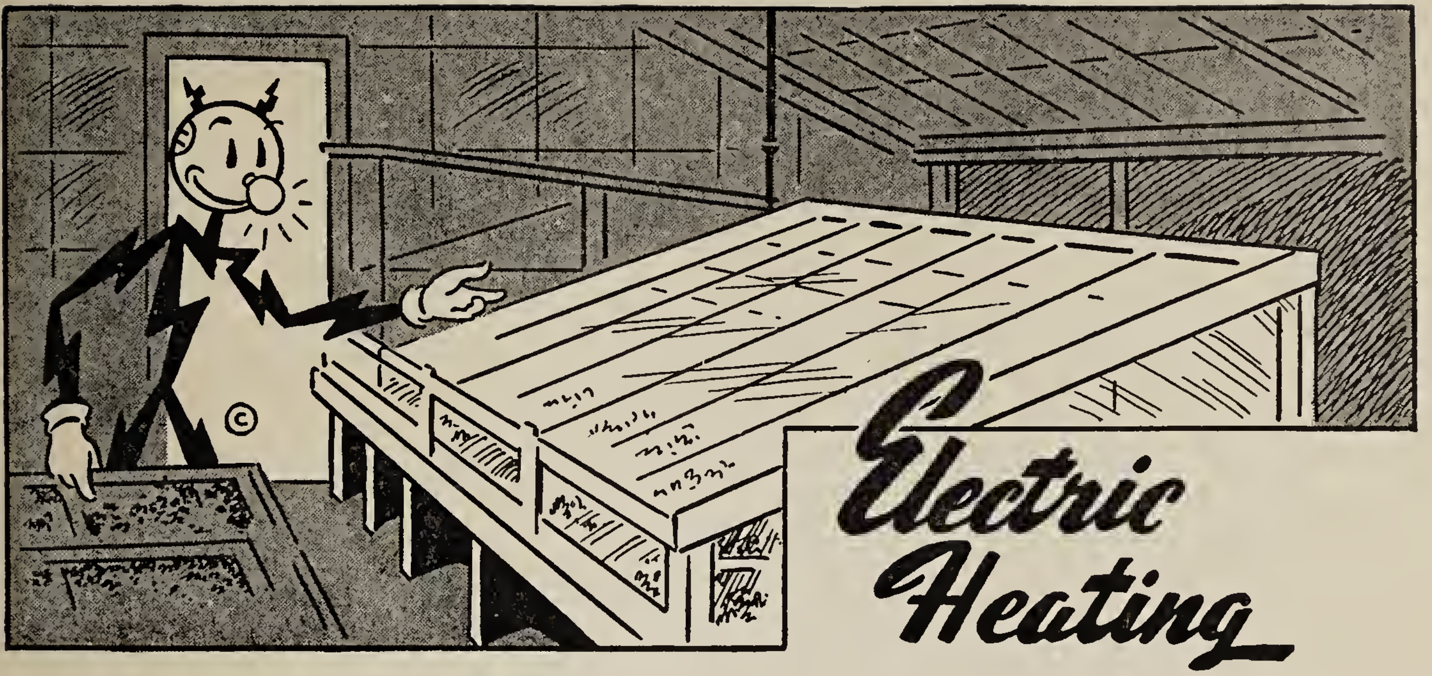

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